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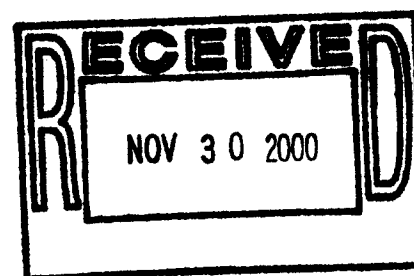
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November 29, 2000

Dr. C. W. Jameson  
National Toxicology Program, Report on Carcinogens  
NIEHS, MD EC-14  
79 Alexander Drive  
Building 4401, Room 3118  
P. O. Box 12233  
Research Triangle Park, NC 27709



Re: National Toxicology Program, 10<sup>th</sup> Report on Carcinogens: Board of  
Scientific Counselors RoC Subcommittee Meeting and Draft RoC  
Background Document for Metallic Nickel and Certain Nickel  
Alloys, 65 Fed. Reg. 61352 (October 17, 2000)

Dear Dr. Jameson:

I am enclosing two copies of the Comments of the Nickel Development Institute (NiDI) and Inco United States, Inc. on the Draft RoC Background Document for Metallic Nickel and Certain Nickel Alloys, which are being considered for possible listing as *reasonably anticipated human carcinogens* in the 10<sup>th</sup> Report on Carcinogens (RoC). I understand that copies of these Comments will be distributed to members of the Board of Scientific Counselors RoC Subcommittee in advance of their meeting on December 13-15, 2000. Also enclosed is a copy of this cover letter and a stamped, self-addressed envelope. Please sign or stamp the copy of the cover letter to acknowledge receipt of these Comments, and mail it back to me.

As indicated in the Comments, NiDI and Inco believe that neither **Metallic Nickel** nor the broad/undefined category of **Certain Nickel Alloys** should be listed as *reasonably anticipated human carcinogens*. In this regard, it is important to emphasize that each type of nickel-containing alloy is a unique substance with its own special physico-chemical and biological properties that differ from those of its individual metal constituents and from those of other alloys. The potential carcinogenicity of a nickel alloy must, therefore, be evaluated separately from the potential carcinogenicity of metallic nickel itself and separately from the potential carcinogenicity of other nickel alloys.

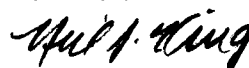
We also suggest that NTP follow IARC's example by performing a separate carcinogenic assessment for orthopedic implants. In that connection, we note that while certain high nickel content alloys have shown some increased tumorigenic activity when implanted as foreign bodies in animal studies (generally in the form of a powder or pelletized fiber porous composite material), those types/forms of nickel alloys are not used for implants in the United States, so there is no reason to list them in the RoC. Conversely, the types and forms of alloys that are used for medical implants (*e.g.*, stainless steels) have shown no evidence of carcinogenicity in human or animal studies via implantation or any other relevant route of exposure, so they should not be listed either.

In sum, there is no basis to list any nickel alloys as *reasonably anticipated human carcinogens* based on the animal implantation data or any other studies. If NTP, nonetheless, decides to list "Certain" Nickel Alloys as *reasonably anticipated human carcinogens via implantation* in the 10<sup>th</sup> RoC (or in a separate assessment for orthopedic implants), the listing should be carefully limited to **particular types and forms of alloys that have demonstrated evidence of tumorigenic activity**, and NTP should emphasize that the listing **applies only when exposure occurs via implantation**. In the event such a listing is made, NTP also should stress that the listing does not apply to any nickel alloys (*e.g.*, stainless steels) that are not covered by the listing description, even if they are used in implants. Otherwise, the listing would send an alarming and scientifically unwarranted message of increased cancer risk to hundreds of thousands of implant wearers whose prostheses contain alloys—like stainless steel—that have shown no evidence of carcinogenic potential, and it would likely deter thousands of others from undergoing medically appropriate and highly beneficial implantation procedures for no good reason.

Finally, we urge NTP to reconsider the pending recommendation to list **Soluble Nickel Compounds** as *known human carcinogens*—in light of significant new developments that were not considered by RG1, RG2, or the BSC Subcommittee when those groups conducted their deliberations in 1998.

If you have any questions regarding the enclosed Comments, please let me know.

Very truly yours,



Neil J. King

Enclosures

BEFORE THE  
DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
NATIONAL TOXICOLOGY PROGRAM

Board of Scientific Counselors'  
Meeting; Review of Nominations for  
Listing In the 10<sup>th</sup> Report on  
Carcinogens, 65 Fed. Reg. 61352  
(October 17, 2000)

COMMENTS OF  
THE NICKEL DEVELOPMENT INSTITUTE  
AND  
INCO UNITED STATES, INC.  
ON THE

**DRAFT REPORT ON CARCINOGENS BACKGROUND DOCUMENT  
FOR METALLIC NICKEL AND CERTAIN NICKEL ALLOYS**

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November 29, 2000

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## Introduction

In the Federal Register of October 17, 2000, the National Toxicology Program (NTP) announced that a meeting of the Board of Scientific Counselors Report on Carcinogens Subcommittee (BSC Subcommittee) would be held on December 13-15, 2000, to review eight nominations for possible listing in the 10<sup>th</sup> Report on Carcinogens (10<sup>th</sup> RoC). 65 Fed. Reg. 61353. The notice also announced that Draft Background Documents for the eight nominated agents were available for comment. **Metallic Nickel and Certain Nickel Alloys** are among the agents to be considered by the BSC Subcommittee—the recommendation being to list them as *reasonably anticipated to be human carcinogens* based on evidence of tumor formation in animals by routes other than inhalation, oral, or dermal exposure.

The present Comments are submitted by the Nickel Development Institute (NiDI) and Inco United States, Inc. (Inco). NiDI is an organization of the world's primary nickel producers. Inco's parent company, Inco Limited, a Canadian corporation, is a member of NiDI. Our Comments focus on the Introduction and Chapter 2 of the Draft RoC Background Document for Metallic Nickel and Certain Nickel Alloys (Draft Background Document), which deal largely with regulatory and exposure-related information. A separate set of Comments submitted by the Nickel Producers Environmental Research Association (NiPERA) addresses the epidemiological, toxicological, and mechanistic information relevant to evaluating the potential carcinogenicity of Metallic Nickel and Nickel Alloys. NiDI and Inco have reviewed NiPERA's Comments on that issue and agree with the points set forth therein—including NiPERA's conclusion that "Metallic

Nickel” and the broad/undefined category of “Certain Nickel Alloys” cannot properly be identified as *reasonably anticipated human carcinogens*.

We recognize that certain high nickel content alloys have shown some increased tumorigenic activity when implanted as foreign bodies in animal studies (generally in the form of a powder or pelletized fiber porous composite material). However, those types/forms of nickel alloys are not used for implants in the United States, so there is no reason to list them in the RoC—which, after all, is supposed to identify known or reasonably anticipated human carcinogens “to which a significant number of persons residing in the United States are exposed.”<sup>1</sup> Conversely, the types and forms of alloys that are used for medical implants (e.g., stainless steels) have shown no evidence of carcinogenicity in human or animal studies via implantation or any other relevant route of exposure, so they should not be listed either.

In any event, like NiPERA, we believe “implants” should be the subject of a separate carcinogenicity assessment by NTP, as they are by IARC. Whether NTP follows that course or instead decides to address implants in the context of evaluating “Certain Nickel Alloys,” we believe, as NiPERA’s Comments demonstrate, that a *reasonably anticipated human carcinogen* listing is not warranted for any nickel alloys. If, however, NTP decides to list “Certain” Nickel Alloys as *reasonably anticipated human carcinogens via implantation*, the listing should be carefully limited to **particular types and forms of alloys that have demonstrated evidence of tumorigenic activity in implantation studies**, and NTP should emphasize that the listing **applies only when exposure occurs via implantation**. In addition, NTP should stress that the listing does

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<sup>1</sup> 9<sup>th</sup> RoC, p. I-1.

not apply to any nickel alloys (e.g., stainless steels) that are not covered by the listing description, even if they are used in implants. Otherwise, the listing would send an alarming and scientifically unwarranted message of increased cancer risk to hundreds of thousands of implant wearers whose prostheses contain alloys—like stainless steel—that have shown no evidence of carcinogenic potential, and it would likely deter thousands of others from undergoing medically appropriate and highly beneficial implantation procedures for no good reason.

Finally, in light of significant new developments that were not considered by RG1, RG2, or the BSC Subcommittee when those groups conducted their deliberations in 1998, we join with NiPERA in urging that NTP reconsider the pending recommendation to list **Soluble Nickel Compounds** as *known human carcinogens*. Before the listing of **Soluble Nickel Compounds** is finalized, RG1, RG2, and the BSC Subcommittee all should consider the *TERA Review*,<sup>2</sup> the papers by Haber *et al.* based on the *TERA* work,<sup>3</sup> and the new information showing that the maximum tolerated dose was, indeed, used in the NTP inhalation bioassay of nickel sulfate hexahydrate. NTP's deferral of the listing of **Nickel Compounds** until the 10<sup>th</sup> RoC presents an opportunity for such reconsideration. In the interest of sound science, the opportunity should not be missed.

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<sup>2</sup> Toxicology Excellence for Risk Assessment, March 1999. *Toxicological Review of Soluble Nickel Salts*.

<sup>3</sup> Haber, L.T.; L. Erdreich, G.L. Diamond, A.M. Maier, R. Ratney, Q. Zhao, and M. Dourson, 2000. Hazard Identification and Dose Response of Inhaled Nickel-Soluble Salts. *Regulatory Toxicology and Pharmacology*. 31:210-230; Haber, L.T., G.L. Diamond, Q. Zhao, L. Erdreich, and M. Dourson, 2000. Hazard Identification and Dose Response of Ingested Nickel-Soluble Salts. *Regulatory Toxicology and Pharmacology*. 31:231-241.

## I. Regulatory Information

A number of statements in the Draft Background Document regarding regulatory or quasi-regulatory matters are incorrect or misleading and should be corrected. They include the following:

- Page 1 of the Draft Background Document says that IARC listed “nickel and nickel compounds as *carcinogenic to humans* (Group 1).” That is incorrect. IARC listed metallic nickel in Group 2B, “*possibly carcinogenic to humans*.” In the Background Document, NTP proposes to go beyond that. Yet, as pointed out in NiPERA’s Comments, epidemiological information that has been reported in the decade since IARC classified metallic nickel in Group 2B makes a classification of *possibly carcinogenic to humans* less supportable than it was in 1990. A *reasonably anticipated* classification is even less congruent with the available data and should not be made.

- Page 1 of the Draft Background Document also says that U.S. EPA “codes are K115 for nickel and P073 for nickel compounds.” This is confusing as well as misleading. Although not stated in the Draft Background Document, these are hazardous waste listing codes under Subpart D of EPA’s hazardous waste regulations. They are not waste codes for nickel and nickel compounds, as the Background Document implies. Instead, K115 is the waste code for “Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.” See 40 CFR § 261.32. P073 is the waste code for nickel carbonyl that has been discarded; it does not apply to other nickel compounds that have been discarded. See 40 CFR § 261.33. Moreover, it is important to note that EPA has not established a “toxicity characteristic” for nickel metal or nickel compounds. See 40 CFR § 261.24.



- Page 1 of the Draft Background Document says that the UN shipping code for “nickel” is UN1378, while the shipping code for “nickel catalyst, dry” is UN2881. More accurately, UN1378 is the shipping code for “Metal catalyst, wetted,” and UN2881 is the shipping code for “Metal catalyst, dry.”

- Table 2-9 of the Draft Background Document purports to outline relevant provisions of the EPA regulations having potential application to nickel. A couple of points need correction.

- On page 27, the Draft Background Document states that solid wastes containing constituents listed in Appendix VIII to 40 CFR Part 261, Subpart D (which includes nickel and nickel compounds) are subject to hazardous waste notification and must be disposed of as hazardous waste in a RCRA-permitted facility. That is not correct. The fact that a constituent appears in Appendix VIII simply means that it may conceivably be the basis for EPA to list a particular waste containing that constituent as a hazardous waste under Subpart D of the regulations. As far as we are aware, the only waste that EPA has listed as “hazardous” because it may contain nickel (among other things) is F006 electroplating waste. With that one exception, the presence of nickel in a waste does not make the waste hazardous under EPA’s RCRA regulations.
- Page 27 of the Draft Background Document also contains some typographical errors regarding the Military Munitions regulations at 40 CFR Part 266, Subpart M. The reference air concentration for nickel

cyanide should be shown as  $20 \mu\text{g}/\text{m}^3$ , and the risk specific dose for nickel subsulfide should be shown as  $2.1 \times 10^{-2} \mu\text{g}/\text{m}^3$ .

- Table 2-11 of the Draft Background Document purports to outline relevant provisions of the OSHA regulations. In discussing 29 CFR § 1910.1450, it states incorrectly that NTP has identified nickel compounds as a known carcinogen. This same statement is made on page 35 of the Draft Background Document, with a citation to the 9<sup>th</sup> Report on Carcinogens as the supporting reference. In fact, the 9<sup>th</sup> Report on Carcinogens does not identify nickel compounds as a *known human carcinogen*.

## **II. Exposure-Related Information**

Several statements in the Draft Background Document regarding exposure-related information are incorrect or misleading and should be corrected. They include the following:

- Page 10 of the Draft Background Document states: "Nickel deposits in Oregon (U.S.) are the largest known source of nickel in the world, followed by Cuba which has 35% of all nickel reserves." Neither of these statements is correct. In particular, the deposits in Oregon were the property of the Glenbrook Nickel Company, which closed its Oregon operations in 1998. As the Draft Background Document notes on the very same page, it is estimated that the company's nickel ore supplies in Oregon "were consumed by March 1998." Obviously, any remaining nickel deposits in Oregon are relatively minor (not "the largest known source of nickel in the world") and will not be a source of exposure to nickel in the United States. In addition to correcting this misstatement, NTP should eliminate Table 2-5 on page 18 of the Draft Background Document, which purports to show measurements of occupational exposure to nickel in the U.S. nickel-

producing industry. The Table is misleading, since primary nickel no longer is mined, refined, smelted, or otherwise produced in the U.S. For the same reason, the reference to potential occupational exposures of nickel miners, nickel refiners, and nickel smelters on page 16 of the Draft Background Document should be deleted.

- Table 2-4 on page 14 of the Draft Background Document indicates that worldwide emissions of nickel into the atmosphere from anthropogenic sources in the mid-1970s totaled 43.1 million kg/year, or 43,100 metric tons per year. The table is misleading—in part because the estimates are dated, and in part because they are not limited to the United States, which is, after all, the focus of the Report on Carcinogens. U.S. EPA's most recent estimates, based on a 1996 emissions inventory, indicate that U.S. emissions of nickel compounds from all stationary and mobile sources combined totaled 1,200 tons per year nationwide.<sup>4</sup> That value is far more accurate and relevant than the figure of 43,100 metric tons contained in Table 2-4.

- Page 15 of the Draft Background Document states: "The general population is exposed to low levels of nickel, because it is widely present in the air, water, and food." To the extent this statement implies that *metallic nickel* "is widely present in the air, water, and food," it is incorrect. The nickel species present in water and food will be soluble nickel compounds, not metallic nickel. Similarly, metallic nickel represents a negligible component of total nickel present in the ambient air—which is comprised overwhelmingly of soluble nickel compounds (primarily nickel sulfate) and oxidic nickel compounds. Moreover, the concentrations of total nickel in the ambient air of the United

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<sup>4</sup> A copy of the relevant page from EPA's National Air Toxics Assessment Website is attached hereto as Appendix A. Virtually all nickel emissions to the atmosphere from anthropogenic sources are in the form of nickel compounds, as opposed to metallic nickel.

States are extremely low—even lower than the values reported on page 15 of the Draft Background Document. Based on a 1996 emissions inventory, EPA's National Air Toxics Assessment shows the national average ambient air concentration of nickel compounds attributable to all stationary and mobile source emissions to be  $0.00226 \mu\text{g}/\text{m}^3$ , while the 95<sup>th</sup> percentile value is  $0.00764 \mu\text{g}/\text{m}^3$ . The comparable values for all urban counties are  $0.0027 \mu\text{g}/\text{m}^3$  for the average ambient concentration and  $0.00845 \mu\text{g}/\text{m}^3$  for the 95<sup>th</sup> percentile value.<sup>5</sup> Since metallic nickel comprises a negligible percentage of total nickel in the ambient air, it is clear that inhalation exposure to metallic nickel by the general population is essentially non-existent.<sup>6</sup> The Draft Background Document should make this point clear.

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<sup>5</sup> Copies of the relevant pages from EPA's National Air Toxics Assessment website are attached hereto as Appendix B.

<sup>6</sup> Metallic nickel almost certainly is less than 1 percent of total nickel in the ambient air. See Comments of the Nickel Producers Environmental Research Association on the National Toxicology Program Proposal to List Metallic Nickel and Nickel-Containing Alloys in the Tenth RoC, June 2, 2000, p. 4 and references cited therein. Based on the urban county average ambient concentration of  $0.0027 \mu\text{g}/\text{m}^3$  for nickel compounds and an assumed metallic nickel component of 1 percent, the average ambient air concentration of metallic nickel in urban counties would be  $0.000027 \mu\text{g}/\text{m}^3$ . At an inhalation rate of  $20 \text{ m}^3$  of air/day, members of the general population would have an intake of only  $0.00054 \mu\text{g}$  (0.5 nanograms) of metallic nickel per day via inhalation.

## Draft for Scientific Peer Review

## 1996 Emissions of Nickel Compounds

State	County	FIPS	Urban or Rural	Pollutant	CAS#	Major		Area and Other		Onroad Mobile		Nonroad Mobile		Total	
						Emissions (tons/yr)	Emissions Density (tons/yr/sq. mile)	Emissions (tons/yr)	Emissions Density (tons/yr/sq. mile)	Emissions (tons/yr)	Emissions Density (tons/yr/sq. mile)	Emissions (tons/yr)	Emissions Density (tons/yr/sq. mile)	Emissions (tons/yr)	Emissions Density (tons/yr/sq. mile)
Puerto Rico	Maunabo Municipio	72095	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	4.52E-03	1.69E-04	3.97E-04	1.49E-05	6.50E-04	2.43E-05	5.57E-03	2.08E-04
Puerto Rico	Mayaguez Municipio	72097	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	3.32E-02	4.95E-04	2.92E-03	4.35E-05	4.77E-03	7.11E-05	4.09E-02	6.10E-04
Puerto Rico	Moca Municipio	72099	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.25E-02	3.64E-04	1.10E-03	3.20E-05	1.79E-03	5.24E-05	1.54E-02	4.49E-04
Puerto Rico	Morovis Municipio	72101	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.11E-02	3.04E-04	9.74E-04	2.67E-05	1.59E-03	4.36E-05	1.37E-02	3.74E-04
Puerto Rico	Naguabo Municipio	72103	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	8.62E-03	1.62E-04	7.57E-04	1.43E-05	1.24E-03	2.33E-05	1.06E-02	2.00E-04
Puerto Rico	Naranjo Municipio	72105	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	7.95E-03	2.67E-04	8.60E-04	2.35E-05	1.41E-03	3.84E-05	1.21E-02	3.29E-04
Puerto Rico	Orocovis Municipio	72107	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	8.20E-03	1.81E-04	7.20E-04	1.59E-05	1.18E-03	2.60E-05	1.01E-02	2.23E-04
Puerto Rico	Patillas Municipio	72109	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	7.22E-03	2.31E-04	6.34E-04	2.03E-05	1.04E-03	3.32E-05	8.89E-03	2.85E-04
Puerto Rico	Penuelas Municipio	72111	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	8.92E-03	2.41E-04	7.84E-04	2.11E-05	1.28E-03	3.46E-05	1.10E-02	2.97E-04
Puerto Rico	Ponce Municipio	72113	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	6.31E-02	8.08E-04	5.54E-03	7.09E-05	9.07E-03	1.16E-04	7.77E-02	9.95E-04
Puerto Rico	Quebradillas Municipio	72115	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	8.68E-03	1.59E-04	7.62E-04	1.40E-05	1.25E-03	2.29E-05	1.07E-02	1.96E-04
Puerto Rico	Rincon Municipio	72117	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	4.57E-03	3.91E-05	4.02E-04	3.44E-06	6.57E-04	5.62E-06	5.63E-03	4.82E-05
Puerto Rico	Rio Grande Municipio	72119	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.69E-02	2.45E-04	1.48E-03	2.15E-05	2.43E-03	3.52E-05	2.08E-02	3.02E-04
Puerto Rico	Sabana Grande Municipi	72121	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	8.19E-03	1.58E-04	7.19E-04	1.39E-05	1.18E-03	2.27E-05	1.01E-02	1.94E-04
Puerto Rico	Salinas Municipio	72123	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	9.89E-03	1.36E-04	8.68E-04	1.20E-05	1.42E-03	1.96E-05	1.22E-02	1.68E-04
Puerto Rico	San German Municipio	72125	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.23E-02	2.30E-04	1.08E-03	2.02E-05	1.77E-03	3.30E-05	1.51E-02	2.83E-04
Puerto Rico	San Juan Municipio	72127	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.45E-01	1.28E-02	1.27E-02	1.13E-03	5.16E-01	4.57E-02	6.73E-01	5.97E-02
Puerto Rico	San Lorenzo Municipio	72129	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.21E-02	1.98E-04	1.06E-03	1.74E-05	1.73E-03	2.85E-05	1.49E-02	2.44E-04
Puerto Rico	San Sebastian Municipio	72131	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.46E-02	4.08E-04	1.28E-03	3.59E-05	2.10E-03	5.86E-05	1.80E-02	5.02E-04
Puerto Rico	Santa Isabel Municipio	72133	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	6.48E-03	1.52E-04	5.68E-04	1.33E-05	9.29E-03	2.18E-05	7.96E-03	1.87E-04
Puerto Rico	Toa Alta Municipio	72135	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	2.03E-02	4.56E-04	1.78E-03	4.00E-05	2.92E-03	6.55E-05	2.50E-02	5.61E-04
Puerto Rico	Toa Baja Municipio	72137	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	3.09E-02	5.56E-04	2.71E-03	4.88E-05	4.44E-03	7.99E-05	3.80E-02	6.85E-04
Puerto Rico	Trujillo Alto Municipio	72139	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	2.51E-02	5.30E-04	2.21E-03	4.69E-05	3.61E-03	7.62E-05	3.10E-02	6.53E-04
Puerto Rico	Uluado Municipio	72141	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.16E-02	1.77E-04	1.02E-03	1.59E-05	1.67E-03	2.54E-05	1.43E-02	2.18E-04
Puerto Rico	Vega Alta Municipio	72143	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.20E-02	1.72E-04	1.05E-03	1.51E-05	1.72E-03	2.47E-05	1.48E-02	2.11E-04
Puerto Rico	Vega Baja Municipio	72145	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	2.06E-02	3.42E-04	1.81E-03	3.01E-05	2.96E-03	4.92E-05	2.53E-02	4.22E-04
Puerto Rico	Vieques Municipio	72147	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	3.09E-03	1.46E-04	2.72E-04	1.28E-05	4.45E-04	2.10E-05	3.81E-03	1.80E-04
Puerto Rico	Villalba Municipio	72149	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	7.71E-03	2.27E-04	6.77E-04	1.99E-05	1.11E-03	3.28E-05	9.50E-03	2.79E-04
Puerto Rico	Yabucoa Municipio	72151	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.39E-02	9.15E-04	1.22E-03	8.03E-05	2.00E-03	1.31E-04	1.71E-02	1.13E-03
Puerto Rico	Yauco Municipio	72153	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.47E-02	3.96E-04	1.29E-03	3.48E-05	2.11E-03	5.89E-05	1.81E-02	4.88E-04
Puerto Rico	All Urban Counties	N/A	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.09E+00	4.71E-04	9.46E-02	4.12E-05	6.50E-01	2.83E-04	1.82E+00	7.95E-04
Puerto Rico	All Rural Counties	N/A	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.95E-01	1.71E-04	1.71E-02	1.50E-05	2.80E-02	2.46E-05	2.40E-01	2.11E-04
Puerto Rico	Statewide	N/A	N/A	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.27E+00	3.71E-04	1.12E-01	3.25E-05	6.78E-01	1.97E-04	2.06E+00	6.01E-04
Virgin Islands	St. Croix	78010	R	Nickel Compounds	N/A	4.90E-02	5.78E-04	1.89E-02	2.23E-04	1.66E-03	1.98E-05	4.40E-02	5.19E-04	1.14E-01	1.34E-03
Virgin Islands	St. John	78020	R	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.32E-03	6.16E-05	1.16E-04	5.41E-06	3.07E-03	1.44E-04	4.51E-03	2.11E-04
Virgin Islands	St. Thomas	78030	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.81E-02	5.65E-04	1.59E-03	4.99E-05	4.22E-02	1.32E-03	6.20E-02	1.93E-03
Virgin Islands	All Urban Counties	N/A	U	Nickel Compounds	N/A	0.00E+00	0.00E+00	1.81E-02	5.65E-04	1.59E-03	4.99E-05	4.22E-02	1.32E-03	6.20E-02	1.93E-03
Virgin Islands	All Rural Counties	N/A	R	Nickel Compounds	N/A	4.90E-02	4.62E-04	2.02E-02	1.90E-04	1.77E-03	1.67E-05	4.70E-02	4.43E-04	1.18E-01	1.11E-03
Virgin Islands	Statewide	N/A	N/A	Nickel Compounds	N/A	4.90E-02	3.54E-04	3.83E-02	2.77E-04	3.37E-03	2.44E-05	8.93E-02	6.46E-04	1.80E-01	1.30E-03
Nationwide	All Urban Counties	N/A	U	Nickel Compounds	N/A	3.07E+02	2.89E-04	3.89E+02	3.40E-04	7.23E+00	6.33E-06	7.42E+01	6.49E-05	7.77E+02	6.80E-04
Nationwide	All Rural Counties	N/A	R	Nickel Compounds	N/A	2.93E+02	1.59E-04	1.11E+02	6.05E-05	3.50E+00	1.90E-06	1.45E+01	7.87E-06	4.22E+02	2.30E-04
Nationwide	Nationwide	N/A	N/A	Nickel Compounds	N/A	6.00E+02	2.01E-04	5.00E+02	1.68E-04	1.07E-01	3.60E-06	8.87E+01	2.97E-05	1.20E+03	4.02E-04

## 1996 Modeled Ambient Concentrations for Nickel Compounds

EPA strongly cautions that these modeling results should not be used to draw conclusions about local concentrations or risk. The results are most meaningful when viewed at the state or national level; for smaller areas, the modeling becomes less certain. In addition, these results represent conditions in 1996 rather than current conditions.

- The modeled estimates presented here are not a direct indicator of risk because they do not factor in the extent to which people are exposed to these pollutants or the widely varying toxic potential of different substances. In the next step of this assessment, EPA will use these ambient concentration estimates in combination with exposure modeling and health effects information to estimate risk.
- The emissions used in this assessment do not reflect potentially significant emission reductions that have taken effect since 1996, including those from: 1) mobile source regulations which are being phased in over time; 2) many of the air toxics regulations EPA has issued for major industrial sources; 3) State or industry initiatives; and 4) any facility closures.
- Methods of estimating emissions, as well as simplified modeling assumptions, may introduce significant uncertainties into each component of the assessment. See the full discussion of these limitations.
- Because of these uncertainties, EPA will not use the results of this assessment to determine source-specific contributions or to set regulatory requirements. However, EPA expects to use these results to inform decisions about the priorities of the air toxics program as well as to guide the collection of additional data that could lead to regulatory decisions.

## Draft for Scientific Peer Review 3

Estimated Annual Average Ambient Concentrations ( $\mu\text{g}/\text{m}^3$ ) for Nickel Compounds

		Percentile Distribution of Ambient Concentrations Across Census Tracts										Contribution to Average from ...				
		Urban or Rural	5th	10th	25th	Median	Average	75th	90th	95th	Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background	
Alabama	Autauga	1001	U	4.75E-05	5.02E-05	7.49E-05	2.52E-04	2.90E-04	4.31E-04	6.13E-04	7.73E-04	6.49E-05	2.11E-04	7.89E-06	6.94E-06	0.00E+00
Alabama	Baldwin	1003	U	7.74E-05	8.75E-05	9.17E-04	1.39E-03	1.56E-03	2.35E-03	3.29E-03	3.39E-03	1.26E-03	9.50E-05	4.34E-06	1.97E-04	0.00E+00
Alabama	Barbour	1005	U	1.53E-05	1.53E-05	1.64E-05	2.93E-05	1.30E-04	3.10E-04	3.25E-04	3.25E-04	1.33E-06	1.18E-04	8.34E-06	2.95E-06	0.00E+00
Alabama	Bibb	1007	R	6.39E-05	6.39E-05	6.45E-05	9.95E-05	1.25E-04	1.86E-04	2.37E-04	2.37E-04	2.51E-07	1.13E-04	7.19E-06	4.21E-06	0.00E+00
Alabama	Blount	1009	U	4.56E-05	4.56E-05	6.29E-05	9.14E-05	1.05E-04	1.53E-04	1.83E-04	1.83E-04	4.84E-06	8.34E-05	6.91E-06	1.01E-05	0.00E+00
Alabama	Bullock	1011	R	1.71E-05	1.71E-05	1.98E-05	2.43E-05	2.43E-05	2.89E-05	3.21E-05	3.21E-05	2.41E-06	1.69E-05	3.45E-06	1.56E-06	0.00E+00
Alabama	Butler	1013	R	1.65E-05	1.65E-05	1.92E-05	5.58E-05	1.68E-04	1.33E-04	9.51E-04	9.51E-04	1.10E-08	1.56E-04	8.78E-06	3.32E-06	0.00E+00
Alabama	Calhoun	1015	R	5.05E-05	6.92E-05	8.46E-05	2.60E-04	5.83E-04	6.89E-04	9.57E-04	3.49E-03	1.74E-06	5.54E-04	1.38E-05	1.38E-05	0.00E+00
Alabama	Chambers	1017	U	4.25E-05	5.27E-05	7.28E-05	2.06E-04	3.31E-04	3.31E-04	8.18E-04	1.31E-03	1.98E-06	3.02E-04	2.04E-05	6.09E-06	0.00E+00
Alabama	Cherokee	1019	R	7.27E-05	7.27E-05	7.77E-05	9.99E-05	2.39E-04	2.56E-04	6.87E-04	6.87E-04	7.53E-06	2.19E-04	8.81E-06	3.80E-06	0.00E+00
Alabama	Chilton	1021	R	3.71E-05	3.71E-05	6.01E-05	6.74E-05	8.59E-05	7.54E-05	1.77E-04	1.77E-04	1.37E-05	5.87E-05	9.51E-06	4.11E-06	0.00E+00
Alabama	Choctaw	1023	R	2.50E-05	2.50E-05	2.53E-05	3.32E-05	4.48E-05	6.42E-05	8.76E-05	8.76E-05	1.76E-05	2.30E-05	3.12E-06	1.08E-06	0.00E+00
Alabama	Clarke	1025	R	2.57E-05	2.57E-05	2.77E-05	4.92E-05	4.77E-05	6.69E-05	6.73E-05	6.73E-05	1.84E-05	2.38E-05	3.92E-06	1.56E-06	0.00E+00
Alabama	Clay	1027	R	2.44E-05	2.44E-05	3.00E-05	4.12E-05	5.15E-05	7.29E-05	9.90E-05	9.90E-05	1.80E-06	4.23E-05	5.40E-06	1.99E-06	0.00E+00
Alabama	Cleburne	1029	R	5.00E-05	5.00E-05	5.39E-05	6.87E-05	7.08E-05	7.89E-05	9.80E-05	9.80E-05	1.90E-06	5.89E-05	7.09E-06	2.99E-06	0.00E+00
Alabama	Coffee	1031	U	2.57E-05	2.92E-05	4.57E-05	1.18E-04	1.89E-04	3.05E-04	3.70E-04	7.84E-04	4.17E-07	1.69E-04	1.49E-05	4.06E-06	0.00E+00
Alabama	Colbert	1033	U	4.47E-05	5.41E-05	1.23E-04	4.72E-04	4.13E-04	6.24E-04	8.13E-04	9.62E-04	8.46E-06	3.90E-04	7.98E-06	8.85E-06	0.00E+00
Alabama	Conecuh	1035	R	1.33E-05	1.33E-05	1.38E-05	2.24E-05	3.08E-05	3.16E-05	8.20E-05	8.20E-05	1.72E-06	2.48E-05	3.27E-06	1.15E-06	0.00E+00
Alabama	Coosa	1037	R	4.22E-05	4.22E-05	4.22E-05	4.56E-05	5.23E-05	6.90E-05	6.90E-05	6.90E-05	3.90E-05	4.10E-05	5.36E-06	2.06E-06	0.00E+00
Alabama	Covington	1039	R	1.72E-05	1.82E-05	3.11E-05	6.57E-05	1.40E-04	2.32E-04	2.37E-04	5.86E-04	0.00E+00	1.27E-04	9.18E-06	3.85E-06	0.00E+00
Alabama	Crenshaw	1041	R	1.99E-05	1.99E-05	2.31E-05	2.57E-05	2.96E-05	3.40E-05	4.93E-05	4.93E-05	1.53E-06	2.18E-05	4.40E-06	1.88E-06	0.00E+00
Alabama	Cullman	1043	R	4.22E-05	4.56E-05	7.46E-05	1.16E-04	1.72E-04	1.56E-04	5.03E-04	9.21E-04	7.52E-06	1.43E-04	1.37E-05	7.87E-06	0.00E+00
Alabama	Dale	1045	R	2.44E-05	2.62E-05	3.61E-05	5.55E-05	1.10E-04	1.18E-04	2.72E-04	4.64E-04	1.01E-06	9.66E-05	5.60E-06	4.80E-06	0.00E+00
Alabama	Dallas	1047	R	3.33E-05	3.93E-05	6.39E-05	1.86E-04	3.73E-04	4.41E-04	1.19E-03	1.29E-03	7.76E-05	2.73E-04	1.77E-05	4.21E-06	0.00E+00
Alabama	DeKalb	1049	R	6.30E-05	7.53E-05	8.90E-05	1.11E-04	2.49E-04	1.97E-04	4.74E-04	1.48E-03	3.77E-06	2.24E-04	1.34E-05	7.80E-06	0.00E+00
Alabama	Elmore	1051	U	6.56E-05	7.94E-05	9.72E-05	1.23E-04	1.32E-04	1.43E-04	1.94E-04	2.46E-04	1.80E-05	1.01E-04	6.63E-06	6.66E-06	0.00E+00
Alabama	Escambia	1053	R	3.04E-05	3.04E-05	5.23E-05	8.60E-05	1.35E-04	1.03E-04	6.42E-04	6.42E-04	1.46E-05	1.04E-04	1.05E-05	5.31E-06	0.00E+00
Alabama	Etowah	1055	U	7.27E-05	7.68E-05	1.36E-04	3.61E-04	6.72E-04	9.36E-04	1.85E-03	2.07E-03	4.30E-06	6.36E-04	1.48E-05	1.78E-05	0.00E+00
Alabama	Fayette	1057	R	1.37E-04	1.37E-04	1.61E-04	4.75E-04	8.62E-04	1.76E-03	1.78E-03	1.78E-03	1.64E-06	8.52E-04	5.67E-06	2.54E-06	0.00E+00
Alabama	Franklin	1059	R	7.82E-05	7.82E-05	9.81E-05	1.06E-04	2.08E-04	1.28E-04	5.80E-04	5.80E-04	7.56E-06	1.87E-04	9.71E-06	3.59E-06	0.00E+00
Alabama	Geneva	1061	R	3.59E-05	3.59E-05	3.91E-05	5.02E-05	5.15E-05	5.72E-05	7.87E-05	7.87E-05	1.74E-06	4.04E-05	6.55E-06	2.89E-06	0.00E+00
Alabama	Greene	1063	R	2.09E-05	2.09E-05	2.18E-05	2.42E-05	3.19E-05	4.19E-05	5.82E-05	5.82E-05	9.08E-06	1.81E-05	3.44E-06	1.24E-06	0.00E+00
Alabama	Hale	1065	R	3.67E-05	3.67E-05	3.87E-05	4.18E-05	6.44E-05	6.17E-05	1.80E-04	1.80E-04	1.18E-05	4.53E-05	5.09E-06	2.19E-06	0.00E+00
Alabama	Henry	1067	R	2.40E-05	2.40E-05	3.38E-05	4.92E-05	4.90E-05	5.94E-05	7.85E-05	7.85E-05	9.05E-06	3.44E-05	3.81E-06	1.81E-06	0.00E+00
Alabama	Houston	1069	U	6.19E-05	6.96E-05	1.04E-04	1.76E-04	3.07E-04	3.76E-04	7.40E-04	9.98E-04	1.70E-05	2.77E-04	7.12E-06	6.25E-06	0.00E+00
Alabama	Jackson	1071	R	4.08E-05	4.10E-05	6.02E-05	8.73E-05	1.24E-04	1.63E-04	1.85E-04	3.86E-04	3.49E-06	9.86E-05	1.07E-05	1.08E-05	0.00E+00
Alabama	Jefferson	1073	U	3.05E-04	4.33E-04	6.46E-04	1.14E-03	1.65E-03	1.65E-03	3.71E-03	4.56E-03	8.16E-05	1.51E-03	2.97E-05	2.23E-05	0.00E+00
Alabama	Lamar	1075	R	8.71E-05	8.71E-05	8.71E-05	1.75E-04	1.51E-04	1.90E-04	1.90E-04	1.90E-04	5.90E-06	1.39E-04	4.25E-06	1.47E-06	0.00E+00
Alabama	Lauderdale	1077	R	4.75E-05	7.40E-05	1.11E-04	4.17E-04	6.44E-04	1.21E-03	1.62E-03	1.81E-03	7.16E-06	6.22E-04	8.78E-06	6.25E-06	0.00E+00

Estimated Annual Average Ambient Concentrations (µg/m³) for Nickel Compounds  
Percentile Distribution of Ambient Concentrations Across Census Tracts

State	County	FIPS	Urban or Rural	Percent Distribution of Ambient Concentrations Across Census Tracts										Contribution to Average from ...				
				5th	10th	25th	Median	Average	75th	90th	95th	Major	Area and Other	Onroad Mobile	Nonroad Mobile	Estimated Background		
Puerto Rico	Morovis Municipio	72101	U	2.21E-04	2.21E-04	2.28E-04	2.77E-04	3.77E-04	5.25E-04	7.31E-04	7.31E-04	0.00E+00	2.75E-04	1.83E-05	8.29E-05	0.00E+00		
Puerto Rico	Naguabo Municipio	72103	U	6.42E-05	6.42E-05	6.55E-05	7.51E-05	8.29E-05	1.00E-04	1.17E-04	1.17E-04	0.00E+00	6.25E-05	5.00E-08	1.55E-05	0.00E+00		
Puerto Rico	Naranjito Municipio	72105	U	3.21E-04	3.21E-04	3.32E-04	3.55E-04	3.78E-04	3.68E-04	5.14E-04	5.14E-04	0.00E+00	2.24E-04	2.04E-05	1.34E-04	0.00E+00		
Puerto Rico	Orocovis Municipio	72107	R	1.74E-04	1.74E-04	2.00E-04	2.60E-04	3.70E-04	5.39E-04	7.85E-04	7.85E-04	0.00E+00	2.90E-04	1.77E-05	6.24E-05	0.00E+00		
Puerto Rico	Patillas Municipio	72109	R	1.16E-04	1.16E-04	1.35E-04	1.61E-04	1.77E-04	2.18E-04	2.69E-04	2.69E-04	0.00E+00	1.39E-04	1.09E-05	2.79E-05	0.00E+00		
Puerto Rico	Penuelas Municipio	72111	U	8.20E-05	8.20E-05	9.20E-05	1.12E-04	1.47E-04	1.71E-04	3.13E-04	3.13E-04	0.00E+00	1.25E-04	1.01E-05	1.18E-05	0.00E+00		
Puerto Rico	Ponce Municipio	72113	U	1.04E-04	1.25E-04	1.61E-04	3.89E-04	4.69E-04	6.07E-04	1.00E-03	1.28E-03	0.00E+00	4.21E-04	2.70E-05	2.06E-05	0.00E+00		
Puerto Rico	Quebradillas Municipio	72115	R	1.10E-04	1.10E-04	1.45E-04	2.08E-04	2.51E-04	3.57E-04	4.77E-04	4.77E-04	0.00E+00	2.17E-04	1.55E-05	1.83E-05	0.00E+00		
Puerto Rico	Rincon Municipio	72117	R	1.32E-04	1.32E-04	1.32E-04	1.38E-04	2.57E-04	5.01E-04	5.01E-04	5.01E-04	0.00E+00	2.23E-04	1.54E-05	1.87E-05	0.00E+00		
Puerto Rico	Rio Grande Municipio	72119	U	9.17E-05	9.17E-05	1.00E-04	1.15E-04	1.69E-04	1.44E-04	5.39E-04	5.39E-04	0.00E+00	1.34E-04	9.57E-06	2.48E-05	0.00E+00		
Puerto Rico	Sabana Grande Municipi	72121	U	7.29E-05	7.29E-05	8.81E-05	1.39E-04	4.88E-04	2.27E-04	2.28E-03	2.28E-03	0.00E+00	4.61E-04	1.30E-05	1.38E-05	0.00E+00		
Puerto Rico	Salinas Municipio	72123	R	1.15E-04	1.15E-04	1.25E-04	1.90E-04	2.93E-04	3.98E-04	8.85E-04	8.85E-04	0.00E+00	2.56E-04	1.63E-05	2.05E-05	0.00E+00		
Puerto Rico	San German Municipio	72125	U	7.36E-05	7.36E-05	7.98E-05	1.17E-04	1.62E-04	2.05E-04	4.09E-04	4.09E-04	0.00E+00	1.42E-04	9.44E-06	1.02E-05	0.00E+00		
Puerto Rico	San Juan Municipio	72127	U	7.68E-04	9.21E-04	1.20E-03	1.70E-03	2.70E-03	2.74E-03	5.75E-03	5.75E-03	0.00E+00	5.95E-04	5.49E-05	2.05E-03	0.00E+00		
Puerto Rico	San Lorenzo Municipi	72129	U	1.18E-04	1.18E-04	1.36E-04	1.68E-04	3.47E-04	5.44E-04	1.11E-03	1.11E-03	0.00E+00	2.91E-04	1.37E-05	4.20E-05	0.00E+00		
Puerto Rico	San Sebastian Municipi	72131	R	1.25E-04	1.41E-04	1.50E-04	2.11E-04	3.15E-04	4.51E-04	5.97E-04	5.97E-04	0.00E+00	2.82E-04	1.68E-05	1.68E-05	0.00E+00		
Puerto Rico	Santa Isabel Municipi	72133	R	1.21E-04	1.21E-04	1.29E-04	1.84E-04	2.87E-04	3.32E-04	8.82E-04	8.82E-04	0.00E+00	2.55E-04	1.50E-05	1.74E-05	0.00E+00		
Puerto Rico	Toa Alta Municipio	72135	U	4.19E-04	4.19E-04	4.30E-04	5.13E-04	7.28E-04	8.81E-04	1.98E-03	1.98E-03	0.00E+00	5.26E-04	2.96E-05	1.73E-04	0.00E+00		
Puerto Rico	Toa Baja Municipio	72137	U	3.62E-04	4.31E-04	4.96E-04	6.77E-04	7.38E-04	8.27E-04	1.18E-03	1.38E-03	0.00E+00	4.20E-04	3.48E-05	2.83E-04	0.00E+00		
Puerto Rico	Trujillo Alto Municipi	72139	U	2.15E-04	2.68E-04	4.02E-04	7.20E-04	7.76E-04	1.10E-03	1.37E-03	1.57E-03	0.00E+00	5.21E-04	3.83E-05	2.16E-04	0.00E+00		
Puerto Rico	Utua Municipio	72141	R	8.58E-05	8.58E-05	8.96E-05	1.38E-04	3.22E-04	5.99E-04	8.36E-04	8.36E-04	0.00E+00	2.98E-04	1.27E-05	1.15E-05	0.00E+00		
Puerto Rico	Vega Alta Municipio	72143	U	2.71E-04	2.71E-04	2.73E-04	3.07E-04	3.60E-04	4.46E-04	5.59E-04	5.59E-04	0.00E+00	2.35E-04	1.79E-05	1.07E-04	0.00E+00		
Puerto Rico	Vega Baja Municipio	72145	U	1.68E-04	1.68E-04	2.27E-04	2.48E-04	3.25E-04	3.03E-04	9.23E-04	9.23E-04	0.00E+00	2.32E-04	1.39E-05	7.85E-05	0.00E+00		
Puerto Rico	Vieques Municipio	72147	R	1.16E-05	1.16E-05	1.60E-05	3.45E-05	4.36E-05	7.11E-05	9.37E-05	9.37E-05	0.00E+00	3.77E-05	3.20E-06	2.70E-06	0.00E+00		
Puerto Rico	Villalba Municipio	72149	U	1.32E-04	1.32E-04	1.38E-04	1.65E-04	2.97E-04	4.58E-04	7.27E-04	7.27E-04	0.00E+00	2.63E-04	1.40E-05	1.97E-05	0.00E+00		
Puerto Rico	Yabucoa Municipio	72151	U	9.53E-05	9.53E-05	1.01E-04	1.18E-04	1.92E-04	2.22E-04	5.62E-04	5.62E-04	0.00E+00	1.59E-04	9.99E-06	2.31E-05	0.00E+00		
Puerto Rico	Yauco Municipio	72153	U	7.89E-05	7.89E-05	7.92E-05	1.19E-04	2.33E-04	3.03E-04	6.85E-04	6.85E-04	0.00E+00	2.12E-04	1.02E-05	1.07E-05	0.00E+00		
Puerto Rico	Urban County Average	N/A	U	8.18E-05	1.01E-04	1.66E-04	4.82E-04	9.16E-04	1.06E-03	1.90E-03	2.74E-03	0.00E+00	3.94E-04	3.04E-05	4.92E-04	0.00E+00		
Puerto Rico	Rural County Average	N/A	R	8.89E-05	9.75E-05	1.21E-04	1.84E-04	2.79E-04	3.58E-04	6.08E-04	7.44E-04	0.00E+00	2.41E-04	1.49E-05	2.31E-05	0.00E+00		
Puerto Rico	State Average	N/A	N/A	8.31E-05	1.01E-04	1.53E-04	3.90E-04	8.15E-04	9.23E-04	1.67E-03	2.62E-03	0.00E+00	3.70E-04	2.79E-05	4.18E-04	0.00E+00		
Virgin Islands	St. Croix	78010	R	1.10E-04	2.53E-04	3.07E-04	4.40E-04	5.47E-04	6.33E-04	9.82E-04	1.64E-03	3.20E-05	1.50E-04	9.64E-06	3.56E-04	0.00E+00		
Virgin Islands	St. John	78020	R	2.82E-05	2.82E-05	2.82E-05	1.04E-04	1.04E-04	1.80E-04	1.80E-04	1.80E-04	0.00E+00	3.01E-05	2.01E-06	7.20E-05	0.00E+00		
Virgin Islands	St. Thomas	78030	U	1.31E-04	1.37E-04	1.66E-04	5.57E-04	7.54E-04	1.41E-03	1.66E-03	1.78E-03	0.00E+00	2.16E-04	1.21E-05	5.26E-04	0.00E+00		
Virgin Islands	Urban County Average	N/A	U	1.31E-04	1.37E-04	1.66E-04	5.57E-04	7.54E-04	1.41E-03	1.66E-03	1.78E-03	0.00E+00	2.16E-04	1.21E-05	5.26E-04	0.00E+00		
Virgin Islands	Rural County Average	N/A	R	2.82E-05	1.10E-04	2.80E-04	4.15E-04	4.98E-04	5.82E-04	9.82E-04	1.64E-03	2.84E-05	1.36E-04	8.79E-06	3.25E-04	0.00E+00		
Virgin Islands	State Average	N/A	N/A	1.10E-04	1.37E-04	2.10E-04	4.27E-04	6.14E-04	9.14E-04	1.64E-03	1.68E-03	1.55E-05	1.73E-04	1.03E-05	4.16E-04	0.00E+00		
National	All Urban Counties	N/A	U	9.08E-05	1.83E-04	5.25E-04	1.42E-03	2.70E-03	3.37E-03	5.90E-03	8.45E-03	4.35E-04	1.82E-03	3.91E-05	4.01E-04	0.00E+00		
National	All Rural Counties	N/A	R	4.28E-06	1.20E-05	3.53E-05	1.04E-04	5.76E-04	3.34E-04	9.79E-04	2.03E-03	1.21E-04	4.23E-04	9.05E-06	2.27E-05	0.00E+00		
National	National Average	N/A	N/A	2.43E-05	5.68E-05	2.53E-04	9.61E-04	2.26E-03	2.79E-03	5.33E-03	7.64E-03	3.70E-04	1.53E-03	3.28E-05	3.22E-04	0.00E+00		

